

## EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the measured performance against the requirements. Currently using updated BAH requirements (Feb '03), including missions through 2006.

All results are reported on the web site:

[http://netstats.eos.nasa.gov/performance/Net\\_Health/EMSnet\\_list.html](http://netstats.eos.nasa.gov/performance/Net_Health/EMSnet_list.html).

### Note the new web page URL!!!!

It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs. (The old URL will continue to work for a while too).

### Highlights:

- Most test results were stable.
- Growing outflow from GSFC DAAC is causing congestion at the ECS firewall. This demonstrates the need for test hosts at the edge routers, to separate network problems from end system problems.
- Rating for US → NASDA remains low due to the inclusion of 4 ISTs for AMSR-E into the requirement. Note: this is possibly an excessive requirement.
- New improved EMSnet performance web site is almost complete -- try it out: <http://ensight.eos.nasa.gov/Networks/emsnet/index.html>

### Ratings:

#### Rating Categories:

**Excellent**: Total Kbps > Requirement \* 3  
**Good**: 1.3 \* Requirement <= Total Kbps < Requirement \* 3  
**Adequate**: Requirement < Total Kbps < Requirement \* 1.3  
**Low**: Total Kbps < Requirement.  
**Bad**: Total Kbps < Requirement / 3

Where Total Kbps = User Flow + iperf monthly average

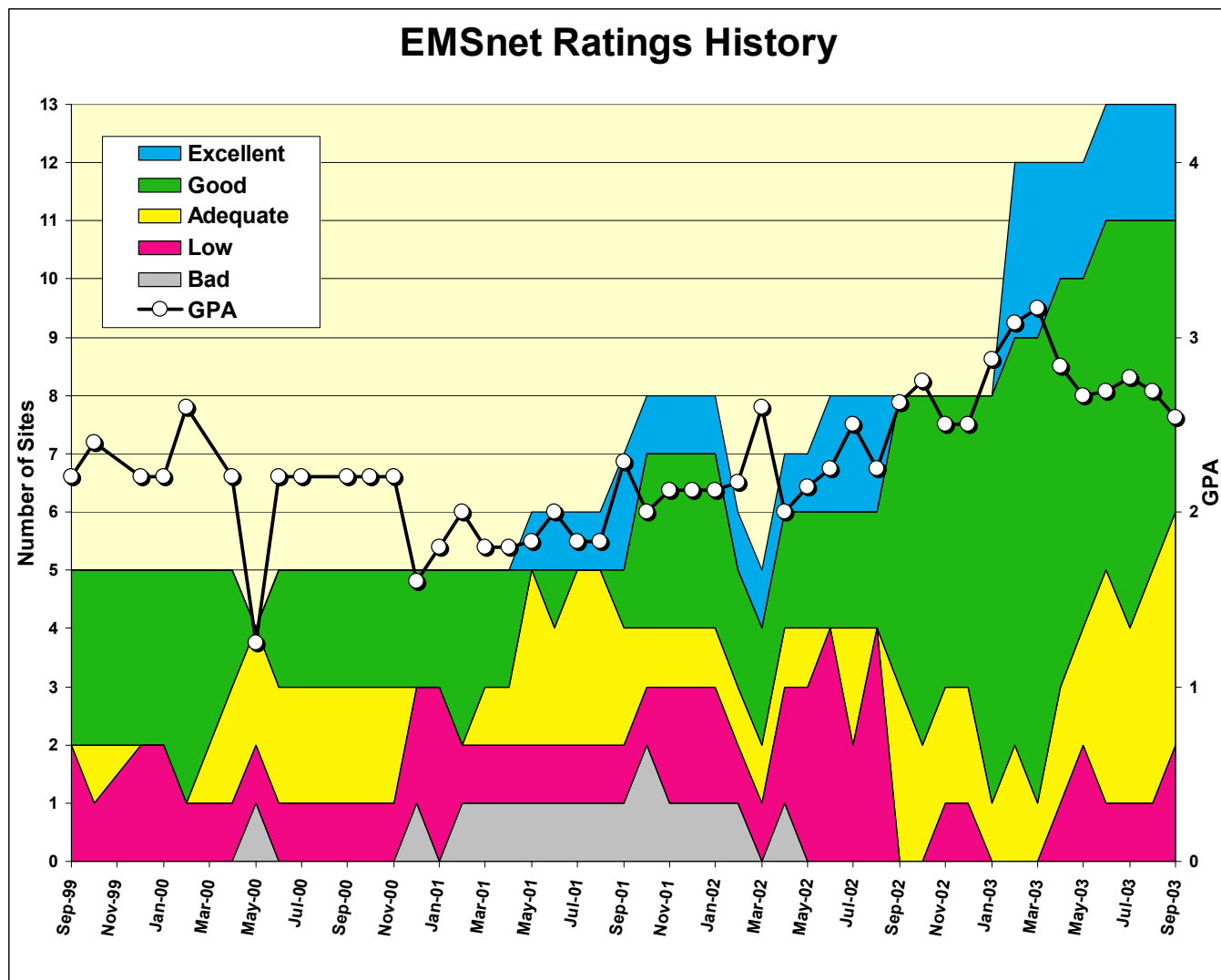
Upgrades: ↑ None

Downgrades: ↓

LDAAC → JPL: Good → **Low**

GSFC → NSIDC: Good → **Adequate**

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



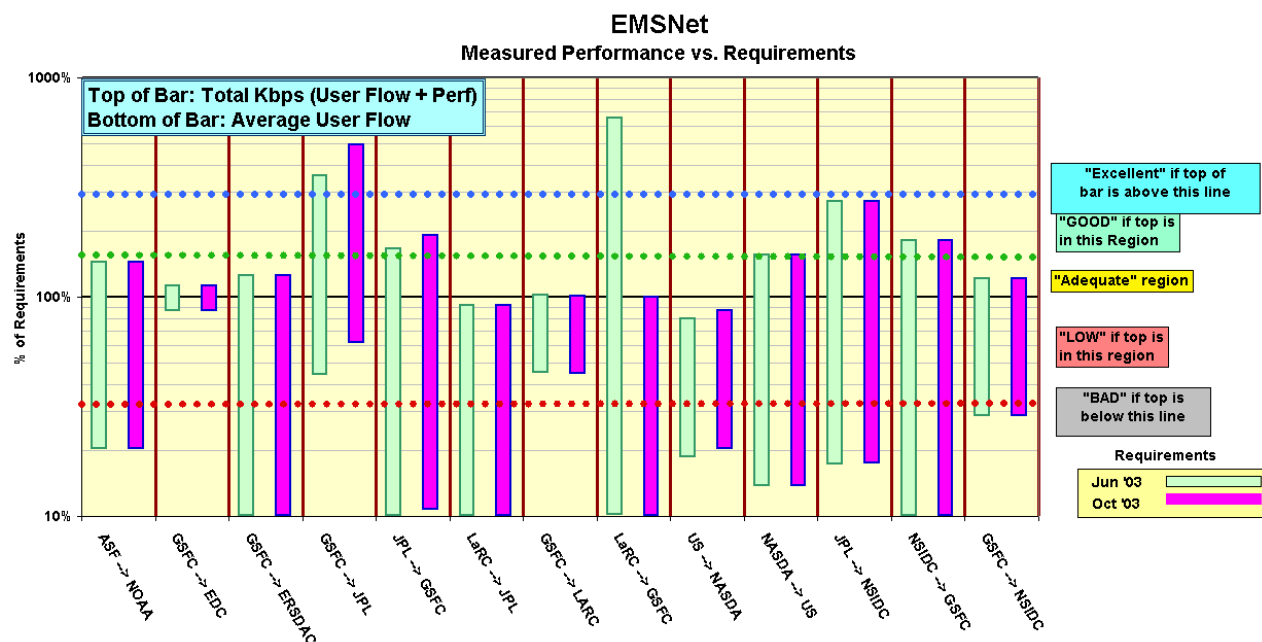
## EMSnet Sites

### Network Requirements vs. Measured Performance

September 2003		Requirements (kbps)		Testing						
Source → Destination	Team (s)	Current	Future	Source → Dest Nodes	Avg User Flow kbps	Perf Avg kbps	Total Avg kbps	Current Status re	Prev Stat	Current Status re
		Jun-03	Oct-03					Jun-03		Oct-03
ASF → NOAA	ADEOS II	1864	1864	ASF → NESDIS	378	2323	2701	GOOD	G	GOOD
GSFC → EDC	MODIS, LandSat	216574	216574	GSFC-DOORS → EDCTest	186832	58000	244832	Adequate	A	Adequate
GSFC → ERSDAC	ASTER	664	664	GDAAC → ERSDAC	58	772	830	Adequate	A	Adequate
GSFC → JPL	ASTER, QuikScat, MLS, etc.	1810	1300	CSAFS → JPL-SEAPAC	796	5667	6463	Excellent	E	Excellent
JPL → GSFC	ADEOS II, AMSR, etc.	5385	4693	JPL-PODAAC → GDAAC	499	8447	8946	GOOD	G	GOOD
LaRC → JPL	TES, MISR	49069	49069	LDAAC → JPL-TES	4822	40140	44962	LOW	G	LOW
GSFC → LARC	CERES, MISR, MOPITT	52446	52664	GDAAC → LDAAC	23501	29836	53337	Adequate	A	Adequate
LaRC → GSFC	MODIS, TES	6777	44795	LDAAC → GDAAC	685	43942	44627	Excellent	E	LOW
US → NASDA	QuikScat, TRMM, AMSR	2856	2623	GSFC-CSAFS → NASDA	527	1743	2270	LOW	L	LOW
NASDA → US	AMSR, ADEOS II	1559	1559	NASDA → JPL-SEAPAC	212	2220	2432	GOOD	G	GOOD
JPL → NSIDC	AMSR	1540	1540	JPL-PODAAC → NSIDC SIDADS	266	3924	4190	GOOD	G	GOOD
NSIDC → GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC DAAC → GDAAC	236	14800	15036	GOOD	G	GOOD
GSFC → NSIDC	MODIS, ICESAT, QuikScat	38234	38234	GDAAC → NSIDC DAAC	10915	35418	46333	Adequate	A	Adequate
Notes: Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II					Ratings					
					Summary					
*Criteria:	Excellent	Total Kbps > Requirement * 3					Jun-03	Reg	Oct-03	
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3			Excellent		Score	Prev	Score	
	Adequate	Requirement < Total Kbps < Requirement * 1.3			GOOD		2	2	1	
	LOW	Total Kbps < Requirement			Adequate		5	6	5	
	BAD	Total Kbps < Requirement / 3			LOW		4	4	4	
					BAD		2	1	3	
							0	0	0	
Change History:	27-Sep-99	Original - TRMM, Terra, and QuikScat								
	19-Jan-01	Incorporated BAH requirements including additional missions					Total	13	13	13
	9-Apr-01	Updated BAH requirements								
	4-Jun-01	Added 50% contingency to BAH requirements					GPA	2.54	2.69	2.31
	16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria								
	2-Oct-02	Updated to revised BAH requirements								
	7-Mar-03	Updated Requirements, Added tests to GSFC, improved User flow calculation								

## Comparison of measured performance with Requirements:

This graph shows two bars for each source-destination pair. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (June '03, and Oct. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below.

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

## Details on individual sites:

### 1) ASF ↔ CONUS:

Rating: Continued **Good**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/ASF-EMS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
ASF → NESDIS	2.36	2.32	0.44	0.38	2.70
ASF → GSFC-CSAFS	2.60	2.37	0.53		
ASF → JPL-SEAPAC	2.79	2.58	1.03		
GSFC-CSAFS → ASF	2.76	2.67	0.77	.044	2.71

Requirements:

Source → Dest	FY	Mbps	Rating
ASF → NESDIS	'03, '04	1.86	<b>Good</b>

**Comments:** The 2.7 mbps total from ASF → NOAA is very good for a 2 \* T1 (3.1 mbps) circuit. Since this is more than 30% over the June '03 requirement, the rating remains "Good". Note: At the beginning of September, one of the two T1s went down – it recovered about 2 weeks later.

### 2) GSFC → EDC:

Rating: Continued **Adequate**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/EDC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
DOORS → EDC Test	112.6	58.0	38.6	186.8	244.8
DOORS → EDC DAAC	124.8	50.4	31.2		
G-DAAC → EDC DAAC	55.6	26.0	12.0		

Requirements:

Date	mbps	Rating
June, Oct '03	216.6	<b>Adequate</b>

**Comments:** The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall to the ECS DAAC, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has very much of an effect on thruput, but the GSFC firewall does. Note that the GDAAC has been sending out 200-300 mbps most of the time for the past month, much of it (187 mbps) to EDC.

This month the user flow increased about 30 mbps, and the corresponding thruput tests decreased, by only 5 mbps, for a total increase in the total of about 25 mbps. The combined user flow + thruput remains above the June and Oct '03 requirement, so the rating remains "Adequate".

**3) JPL:**

Ratings: GSFC → JPL: Continued **Excellent**  
 JPL → GSFC: Continued **Good**  
 LaRC → JPL: ↓ Good → **Low**

Web Pages:

[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-SEAPAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-PODAAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-TES.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-MISR.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-MISR.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → JPL-SEAPAC	6.08	5.67	2.16	0.80	6.46
LaRC DAAC → JPL-TES	40.40	40.14	22.98	4.82	44.96
LaRC DAAC → JPL-MISR	39.13	38.49	18.35		
JPL-PODAAC → GSFC DAAC	11.26	8.45	4.41	0.50	8.95

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Dec '02, Oct '03	1.61, 1.30	<b>Excellent</b>
JPL → GSFC combined	Dec '02	4.86	<b>Good</b>
LaRC DAAC → JPL-TES	Oct '03	30.6	
LaRC DAAC → JPL-MISR	Oct '02	18.5	
LaRC DAAC → JPL-Combined	Oct '02	49.1	<b>Low</b>

**Comments:**

**GSFC → JPL:** Performance on this circuit has been mostly stable since the BOP switchover on 15 August '02. However, on 16 June 2003, performance from MTVS1 to JPL PODAAC, and from G-DAAC to JPL-TES dropped and became noisier. (For example, from MTVS1 to PODAAC, the median dropped from 5.8 mbps to 2.8). However, the GSFC-CSAFS → JPL-SEAPAC results above (still stable) shows that the problem is not in EMSnet.

**LDAAC → JPL:** Performance from LDAAC to JPL-TES has been very stable since June 23, '03, when the PVC was set to the current value of 45 mbps. The combined MRTG and iperf values total very close to this value, indicating that the circuit is working to its specifications.

The route from LDAAC to the JPL-MISR SCF was switched to EMSnet in July. The performance for LDAAC to JPL-MISR via EMSnet shown above is, as expected, very similar to the performance to TES.

However, when the 18.5 mbps MISR requirement is added to the 30.6 mbps TES requirement, the 49 mbps total requirement is higher than the measured performance, and also higher than the nominal circuit speed. Thus the rating drops to "Low".

This configuration is based on a management decision to set the circuit capacity at this level to reduce cost; in the expectation that both projects' requirements are bursty and include contingency. Thus the actual requirements of both projects are expected to be met with this circuit capacity.

**JPL → GSFC:** The requirement from JPL to GSFC includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. The combined Dec. '02 requirement is 4.86 mbps, and the combined thruput (9.13 mbps) is more than 30% above that, so the rating remains "Good".

**4) NSIDC:**

Ratings: GSFC → NSIDC: ↓ Good → **Adequate**  
 NSIDC → GSFC: Continued **Good**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/NSIDC-EMS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html)

**GSFC ↔ NSIDC Test Results:**

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-DAAC → NSIDC	88.5	35.4	12.8	10.9	46.3
NSIDC → GSFC-DAAC	16.5	14.8	6.5	0.24	15.0

**Requirements:**

Source → Dest	Date	mbps	Rating
GSFC → NSIDC	June, Oct '03	38.2	<b>Adequate</b>
NSIDC → GSFC	'03, '04	8.3	<b>Good</b>

**Comments:**

Performance from GSFC to NSIDC and from NSIDC to GSFC remains generally steady. However, the GSFC outflow congestion reduced the median and worst measurements to NSIDC (peaks were stable), dropping the ratings for both FY '03 and '04 to "Adequate".

**Other Testing:**

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
JPL → NSIDC-SIDADS	5.38	3.92	2.86	1.54	<b>Good</b>
GSFC-ISIPS → NSIDC	7.29	6.97	5.90		
LDAAC → NSIDC	4.88	4.77	4.60	0.07	<b>Excellent</b>

**Comments:**

**JPL → NSIDC-SIDADS:** Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement.

**GSFC-ISIPS → NSIDC:** Testing is ftp pulls by NSIDC from ISIPS. Performance is very steady at 7 mbps, apparently limited by ftp window size. Manual testing using iperf between the same machines in the same direction gets over 20 mbps.

**LDAAC → NSIDC:** Thruput from LDAAC to NSIDC has been steady since August. The very low requirement produces a rating of "Excellent".

**5) GSFC ↔ LaRC:**

Ratings: GDAAC → LDAAC: Continued **Adequate**  
 LDAAC → GDAAC: Continued **Excellent**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/LARC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GDAAC → LDAAC	54.6	29.8	9.6	23.5	53.3
LDAAC → GDAAC	51.0	43.9	26.3	0.7	44.6

Requirements:

Source → Dest	Date	Mbps	Rating
GDAAC → LDAAC	June, Oct '03	52.7	<b>Adequate</b>
LDAAC → GDAAC	June '03	6.8	<b>Excellent</b>
LDAAC → GDAAC	Oct '03	44.8	<b>Low</b>

**Comments:** Performance from GSFC was generally stable, with the large GSFC outflow reducing the total a bit. The combined thruput is still above the June and Oct. '03 requirement, but not with a 30% margin, so the rating remains "Adequate".

The LaRC → GSFC performance remains "Excellent" based on June '03 requirements. But by FY '04 it is planned to backhaul all LaRC science outflow via GSFC, greatly increasing this requirement. The circuit was upgraded to meet this requirement on 18 June -- median thruput was 24 mbps prior to that. But the thruput is slightly below this future requirement, so the Oct '03 rating drops to "Low".

**6) GSFC → ERSDAC:**

Rating: Continued **Adequate**

Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/ERSDAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html)

Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC → ERSDAC	800	772	513	58	830

Requirements:

Source → Dest	FY	Kbps	Rating
GSFC → ERSDAC	'03, '04	664	<b>Adequate</b>

**Comments:** Thruput since June '02, using the 1 mbps ATM connection had been very stable (except for a problem period from 12 November '02 to 3 Jan '03). The total user flow plus iperf is a bit below 30 % over the requirement, so the rating remains "Adequate".



**7A) US → NASDA:**Rating: Continued **Low**Web Page: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/NASDA-EMSnet.html](http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html)

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → NASDA-EOC	2.03	1.74	1.15	0.53	2.27
ASF → NASDA-EOC	2.11	1.83	1.00		

Requirements:

Source → Dest	FY	mbps	Rating
GSFC → NASDA	Dec '02	2.86	Low
GSFC → NASDA	Oct '03	2.62	Low

**Comments:** Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Results from ASF to NASDA were slightly better than from CSAFS. The requirements above include 4 ISTs at NASDA for AMSR-E. Each IST has a requirement for 311 kbps, for a total of 1244 kbps. This requirement causes the rating to be "Low", even though the performance was stable. It could be questioned whether NASDA intends to operate all four of the ISTs simultaneously, or whether some ISTs are backups, in which case the network requirements would be reduced to a value attainable with the current circuit.

**7B) NASDA → US:**Rating: Continued **Good**

Web Pages: [http://corn.eos.nasa.gov/performance/Net\\_Health/files/JPL-SEAPAC.html](http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html)  
[http://corn.eos.nasa.gov/performance/Net\\_Health/files/GSFC-SAFS.html](http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html)

NASDA-EOC	JPL_SEAPAC	2242	2220.75	821
NASDA-EOC	GDAAC_EMS	1534	1362.75	428

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
NASDA-EOC → JPL-SEAPAC	2.24	2.22	0.82	0.21	2.43
NASDA-EOC → GSFC-CSAFS	1.53	1.36	0.42		

Requirements:

Source → Dest	FY	mbps	Rating
NASDA → US	'02, '03	1.56	Good

**Comments:** Performance continues stable on the new circuit. The rating remains "Good".

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely limited by the TCP window size. The Trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.